for "double the sum for which he was imprisoned," if such sum does not include the officer's fees for the commitment, it is sufficient, and such officer is not liable in debt for the escape: *Gordon* v. *Edson*, 2 N. H. 152.

HUGH WEIGHTMAN.

NEW YORK.

MICROSCOPICAL EXAMINATIONS OF BLOOD IN ITS RELATION TO CRIMINAL TRIALS.

IT was the endeavor of the author in the articles published in this magazine for October 1876, and for May 1877, to show to the profession what amounted to a demonstration to his own mind at the time that the red blood corpuscles of other animals could be distinguished from those of man by a system of measurement therein set forth.

This conclusion was arrived at by an extended series of experiments upon different kinds of mammalian blood, and also of that of some other species of animals.

Since the above articles were written, a year has passed away, and the author has continued his observations in the same direction, making a large number of experiments, as enumerated below. This paper still further illustrates the certainty of these conclusions, and also what is of scarcely less importance in criminal trials, the practicability of transferring blood corpuscles from hard opaque substances, and of being able to identify and distinguish them in the same manner as in the case of those received directly on glass.

Blood corpuscles when drying on surfaces on which they do not slide or contract during the process, preserve their areas unchanged; and with the serum form a coat or thin glaze which is quite hard and brittle. In the process of transferring them from the substances on which they are received to the glass slide on which they are to be examined by means of the microscope, they mostly separate from the serum, as shown in plate 1, post, page 556. Under these conditions, unless some watery fluid, or other agent is brought to act upon them, they retain their form with as much certainty as they would if they were constituted of glass or metal.

By my present method of working I do not allow any substance to come in contact with the dried corpuscles which can exert the least influence upon them either to enlarge or contract their area.

For this reason I use the word transfer as the correct term to specify my process, as by it they are presented under the microscope precisely in size and form as they exist on the substance on which they were first received. If we consider that the microscope acts merely as magnifying spectacles in enabling us to see minute objects we shall understand that by a sufficiently extended course of study we may be able to arrive at the accuracy of results which I claim under the requirements and conditions which I have set forth in these papers. From the above definition, it will also be seen to how large a number of legal questions microscopic investigation may become of prime importance.

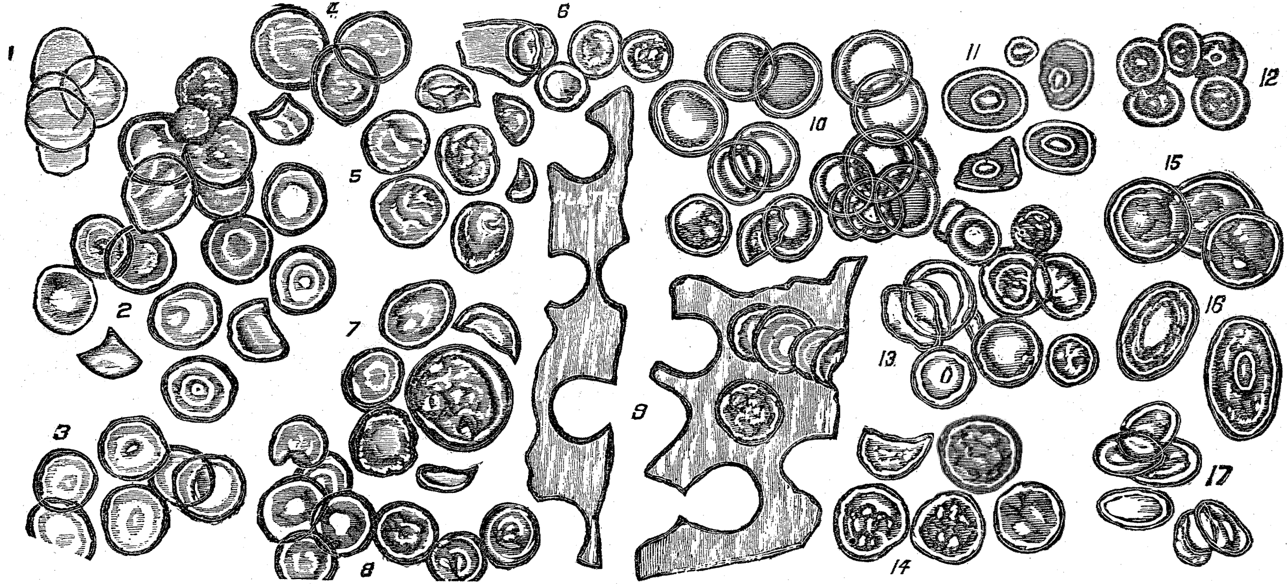
The accompanying plates have been made for the purpose of exhibiting drawings of blood corpuscles which have been transferred from various substances to glass slides, so as to be seen and figured by means of the microscope; they also show drawings of blood forms made from the slides on which they were originally received.

Blood corpuscles, transferred by the method which I have adopted for the purpose, are as clearly and distinctly visible on the slide as are their images on the engraved plates. They appear much more sharp in outline when thus removed from a glass surface, than is the fact when they are examined before such removal. Those corpuscles which are faint, and which give very uncertain outlines on the original slide, are by such transference brought distinctly into view. This result seems to depend upon the fact that the serum of the blood, in drying, forms a coating on the surface of the slide around the corpuscles which interferes somewhat with the passage of the light, while in the process of removal they are in most cases separated from this coating, and the light thus being allowed to pass directly through the glass gives a very sharp black outline.

The appearance of the dried coating of serum on the glass is shown on Plate 1, Fig. 9. This coating sometimes adheres to the corpuscles, as seen in Figs. 1, 6, 9, 13.

I have transferred blood corpuscles from many other substances, in addition to those here described, such as unsized paper, cotton, woollen, linen and silk fabrics, metallic surfaces, wood, &c.

The slides have been preserved in all cases, and are open to inspection.



Description of Plate 1.

Fig. 1—Rabbit's blood transferred from glass. Fig. 2—Human blood transferred from glass. Fig. 3—Human blood from original slide. Fig. 4—Blood 20 years old transferred from glass. Fig. 5—From cover of book (leather). Fig. 6—Hog's blood from glass. Fig. 7—From letter envelope. Fig. 8.—Dog's blood transferred from glass (2 years old). Fig. 9—Serum as seen on original slide. (The vacant spaces show where corpuscles have been removed.) Fig. 10—Blood from pebble. Fig. 11.—Frog's blood from knife blade magnified 518 diameters. Fig. 12—Ox blood from glass. Fig. 13—Human blood from varnished wood. Fig. 14—Human blood from oiled paper. Fig. 15—Elephant's blood from glass. Fig. 16—Hen's blood from glass. Fig. 17—Camel's blood from glass. In all these cases, except in Figs. 3 and 9, the drawings were made from blood corpuscles which had been transferred from the substances on which they were first received and afterward mounted on glass slides. The magnifying power, except in case of the frog's blood, was 1230 diameters.

Description of Plate 2.

Figs. 1, 1*—Blood corpuscles transferred from glass and shown by means of the microscope by change of eye-pieces. Small row magnified 1230 diameters, average measurement, $\frac{1}{3295}$ of an inch; large row, 2144 diameters, average $\frac{1}{3291}$.

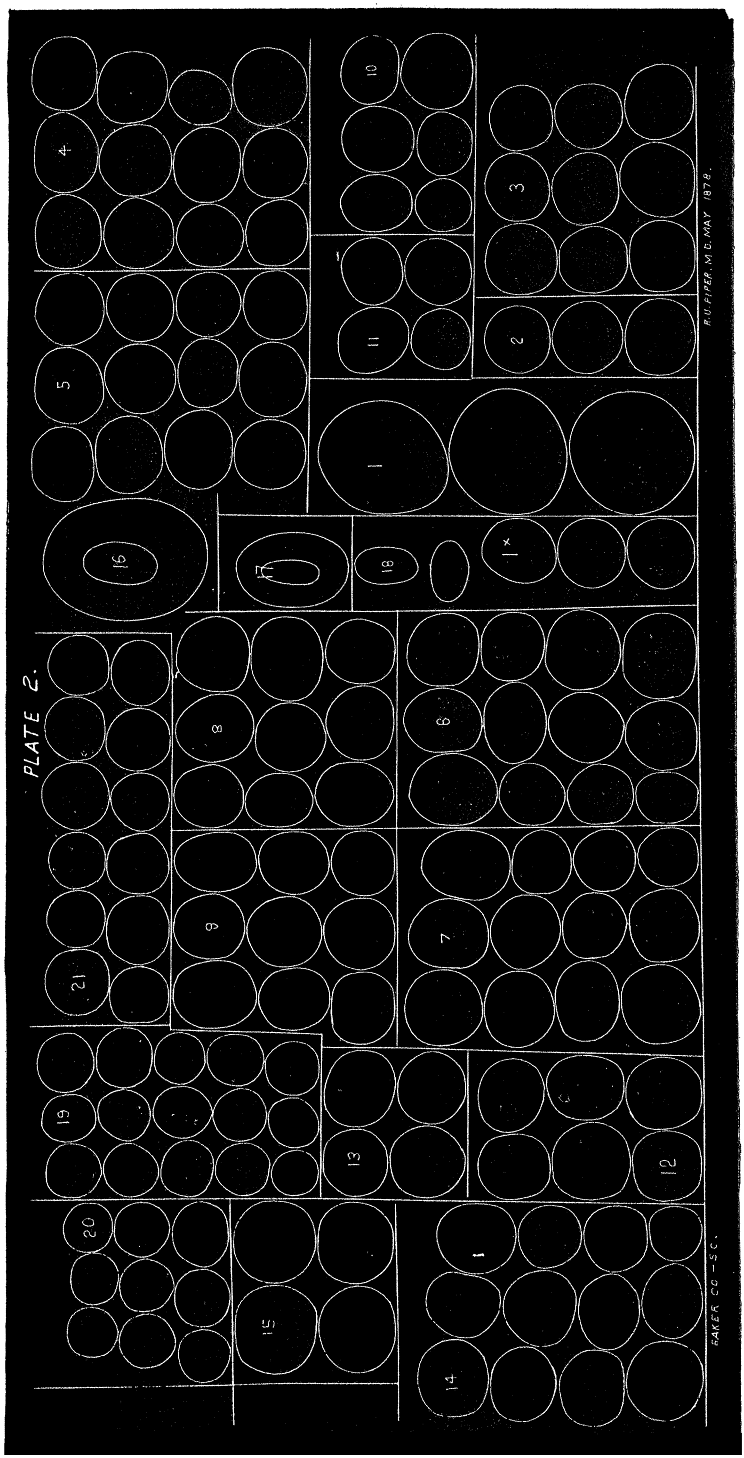


PLATE 2.
R.U. PIPER. M.D. MAY 1878.
BAKER CO – SC.

The original measurements were made from the base and perpendicular lines, as before described. They will not be found to vary much in the engraving. Two measurements have been made, except in case of Figs. 1, 1* and 2. The magnifying power in Fig. 1 is 2144 diameters, in Figs. 4 and 5, 1200; in all the rest the power used was 1230 diameters.

Fig.	2.	From glass,	$\frac{1}{3217}$.
"	3.	" black glazed paper,	$\frac{1}{3271}$.
"	4.	Transferred from glass,	$\frac{1}{3243}$.
"	5.	From original slide, same blood as Fig. 4,	$\frac{1}{3230}$.
"	6.	From knife blade,	$\frac{1}{3270}$.
"	7.	" slide, same blood as Fig. 6,	$\frac{1}{3285}$.
"	8.	" painted surface,	$\frac{1}{3280}$.
"	9.	" book cover (leather),	$\frac{1}{3285}$.
"	10.	Dog's blood, from slide,	$\frac{1}{3586}$.
"	11.	" " transferred,	$\frac{1}{3564}$.
"	12.	From oiled paper,	$\frac{1}{3262}$.
"	13.	" wood surface,	$\frac{1}{3258}$.
"	14.	Same blood as Fig. 13, from slide,	$\frac{1}{3266}$.
"	15.	Elephant's blood, transferred,	$\frac{1}{2760}$.
"	16.	Frog's " "	
"	17.	Hen's " "	
"	18.	Camel's " "	
"	19.	Ox " "	$\frac{1}{4242}$.
"	20.	Hog's " "	$\frac{1}{4225}$.
"	21.	Rabbit's " "	$\frac{1}{3632}$.

Average measurement deduced from all the human blood tables in the plate which have been measured two ways, $\frac{1}{3255}$ of an inch. This includes all these tables except Figs. 1, 1* and 2.

Figs. 1, 1*, Plate 2, exhibit one method of testing the accuracy of my system of drawing and measurement in these cases.

I have made upon this principle a number of tables containing in all several hundred corpuscles, the result of the comparative measurement of which varies but little from that here given.

This plate is made mainly for the purpose of showing that blood corpuscles can be obtained from most, perhaps all, solid substances on which blood spots may be found, so as to be clearly identified, and that they lose nothing in superficial area, in many cases, through the process of drying. Of course this applies to thin layers of these corpuscles only. My system of measurement, which has been before fully described, is, in brief, as follows:—

In the first place, the corpuscles are drawn in rows arranged in tables, as shown on the plate, by means of the camera lucida.

These tables are begun by drawing the outline of a corpuscle in the corner of a figure formed by the meeting of two lines at a right angle. The table is filled up by successive drawings in regular order, the paper being moved into position beneath the image of each corpuscle as seen in the prism. The rows are measured as they are arranged in the tables. This gives, of course, the sum of the measurement of two diameters of each figure, the diameters crossing each other at right angles. This sum is divided by double the number of corpuscles, which gives the average diameter of one of the figures, and this quotient by the magnifying power, which gives the true average diameter of the corpuscles. In important legal cases, we should, I think, when practicable, make several of these tables, each table consisting of fifty or more corpuscles. Perhaps, however, as I have suggested elsewhere, a decision in a given case might be safely based upon the comparison of a small number of large sized corpuscles. Thus if we were to find in such case a few corpuscles 0095 millimeter, $\frac{1}{2671}$ of an inch in diameter, as quoted by Dr. Woodward, and were to compare them with the largest found in dog's blood, as given by the same authority, 0085 millimeter, $\frac{1}{2985}$ of an inch, we might safely conclude that the first did not belong to a dog. It would be well, I think, to seek for these large corpuscles in every case. Where the averages were low, on account of a preponderance of small sized corpuscles, we should still have data on which to found a conclusion, and they might also add force to conclusions based on average measurements.

In forming my tables, I reject only broken or badly deformed corpuscles. It is best to make the drawings from corpuscles which are not in contact with each other where it is possible to do so.

In some cases they preserve their forms when deposited in layers, like those seen in the plate. I have found no difference in the average measurement of blood corpuscles taken as above and those on the same slide selected on account of their near approach to a circular form. I have made quite a large number of tables for the purpose of settling this question.

Since preparing the drawings for these plates, I have had put in my hands for examination a piece of glass stained with blood, and also a knife with its blade in a similar condition. From the knife blade I have made three slides, and from the corpuscles on

the glass and from those transferred from the steel I have made drawings of two tables, each table consisting of 56 corpuscles The double measurement of the first table amounts to 40.94 inches, of the second to 40.98 inches; 1st average $\frac{1}{3284}$ of an inch; 2d average, $\frac{1}{3298}$ of an inch. In another case, in comparing tables made from one slide, two of 72 corpuscles each, one measured 52.84 inches = average of corpuscles, $\frac{1}{3270}$ of an inch; second table measured 52.80 inches = average of corpuscles, $\frac{1}{3273}$ of an inch. From the same slide, two of 36 corpuscles each, one = 36.47 inches, the other 36.32 inches = $\frac{1}{3263}$ and $\frac{1}{3280}$ of an inch; same slide, two of 16 each 11.79 and 11.71 inches, = $\frac{1}{3260}$ and $\frac{1}{3278}$ of an inch. From another slide, another person's blood, two tables of 24 corpuscles each, 17.74 and 17.77 inches = $\frac{1}{3246}$ and $\frac{1}{3243}$ of an inch; from same slide, two tables, 36 each, $\frac{1}{3250}$ and $\frac{1}{3241}$ of an inch. The magnifying power in these cases was 1200 diameters. As no measurement is possible in any case until a table is completed, it will be seen that by no provision on the part of the observer, or chance arrangement whatever, could such a result be brought about, in a single case even.

Since my paper published in the LAW REGISTER, of May 1877, was written, I have drawn and measured over 6000 human blood corpuscles, from more than 50 individuals, and over 3000 from dogs of almost every variety of breed; the average measurement in the first case being $\frac{1}{3267}$ of an inch, in the dog $\frac{1}{3594}$ of an inch. These averages are very near those given by Schmidt, *e. g.:* human blood, $\frac{1}{3266}$ of an inch; dog's blood, $\frac{1}{3625}$ of an inch. I do not think the averages would vary very much under the use of object glasses of sufficient magnifying power, provided the drawings are made from corpuscles lying near the centre of the field.

If this is not observed, the averages are liable to be too high, either from the want of correction in the original construction of the object glass or the proper adjustment of the screw-collar arrangement in those glasses which are furnished with that appliance. This is, perhaps, the source of the varying results, in respect to measurement in these cases, recorded by different observers.

It is quite easy to arrange the instrument so as to be able to bring the blood corpuscles in the centre of the field by the movement of the slide. This can be done by making a very minute ink spot in the centre of the inner surface of the field glass.

In respect to structural changes in blood corpuscles brought

about by disease and other causes, I have been able, in a criminal case, to demonstrate to the court and jury, by means of drawings, the difference between the blood of two individuals, without having previously been informed of the fact of disease in one of the parties. This will be understood by physicians; referring to cases of Leukæmia, as also, perhaps, to those cases of venereal disease connected with intemperance, a number of which I have myself examined, and have recorded by means of drawings. I have also been able, in a criminal case, to find, by means of the microscope, pieces of shaven beard, spiculæ of bone, brain matter, &c., which would have settled the charge of murder, had it not been possible to decide the question first propounded as to the kind of blood under examination.

R. U. PIPER, M. D., Chicago.

RECENT AMERICAN DECISIONS.

Supreme Court of Rhode Island.

HORACE F. READ v. PATRICK POWER.

Where the *cestui que trust* of real estate has an absolute interest without any control in the trustee, the former may, as a general rule, alien his estate. Where the *cestui* has been in possession a long time, the court may direct a jury to presume a conveyance from the trustee to perfect the title, or may itself act upon the same presumption.

But where the legal title is in a trustee, though only for a naked trust to convey, a purchaser from the *cestui que trust* will not, in the absence of an express agreement to accept the equitable title only, be compelled, on a bill for specific performance, to accept the title from the *cestui* unless it is perfected by a conveyance of the legal estate from the trustee.

BILL in equity for specific performance of an agreement for the sale and purchase of real estate. It appeared that the complainants held under a deed from the Providence Aqueduct Co. to Zephaniah Wood, which contained the following *habendum*:

"To have and to hold the above bargained premises to him, the said Zephaniah Wood, his heirs and assigns for ever, in special trust, however, to and for the following uses and purposes, to wit:

"The said Wood and his successor or successors in this trust shall hold said premises to and for the sole and separate use and benefit of Charlotte M. Read, wife of Horace Read, of said Providence, for and during the full term of her natural life, separate from and independent of any interference or control of her present or of any future husband, he, the said Wood, paying over to her,